

CLAIMS

1. A HBV precore protein that has an ability of forming the core-like particles of HBV and that contains all or part of the signal sequence.
- 5 2. A HBV precore protein that has an ability of forming the core-like particles of HBV, in which the N-terminal of the amino acid sequence is at position -28 and the C-terminal is at positions 150-154.
- 10 3. The HBV precore protein according to claim 1 comprising the amino acid sequence as set forth in SEQ ID NO: 1.
4. HBV core (like) particles or HBV virus (like) particles comprising the HBV precore protein according to any one of claims 1 to 3.
- 15 5. A HBV vaccine or a therapeutic agent comprising the HBV precore protein according to any one of claims 1 to 3.
- 20 6. A HBV diagnostic reagent or a diagnostic kit comprising the HBV precore protein according to any one of claims 1 to 3.
7. A method of determining the HBV precore protein according to any one of claims 1 to 3.
- 25 8. The method according to claim 7 comprising the step of exposing the HBV precore protein according to any one of claims 1 to 3 and the step of binding to a probe that recognizes the HBV precore protein.
9. The method according to claim 7 or 8 wherein said step of exposing the HBV precore protein is treatment with, or addition of, a surfactant.
- 30 10. The method according to any one of claims 7 to 9 wherein said surfactant is any of an anionic surfactant, an anionic surfactant and an ampholytic surfactant, or an anionic surfactant, an ampholytic surfactant and a nonionic surfactant.
- 35 11. The method according to any one of claims 7 to 10 wherein said probe that binds to the HBV precore protein is a probe that binds to the positions -28 to -11

of the amino acid sequence, or a probe that specifically binds to the HBV precore protein according to any one of claims 1 to 3 and that does not bind to HBe antigen or HBc antigen.

5 12. The method according to any one of claims 7 to 11 wherein said probe that binds to the HBV precore protein is an antibody.

10 13. The method according to any one of claims 7 to 12 wherein said antibody is a combination of two or more of antibodies that recognize positions 1 to 19, an antibody that recognizes positions 21 to 40, an antibody that recognizes positions 31 to 49, an antibody that recognizes positions 130 to 140, and an antibody that recognizes the structural region of positions 1 to 81 of
15 the amino acid sequence.

 14. A method of determining particulate HBV precore/core protein which comprises (immuno) precipitating with a probe such as anti-HBs antibody that binds to HBs antigen and determining the HBV precore/core
20 protein in the precipitate.

 15. A method of determining the value of the particulate HBV precore/core protein in a sample wherein it is calculated by subtracting the measured value of the HBe antigen when the value of the HBe antigen is included
25 in the measured value of the HBV precore protein determined by a method described in any one of claims 7 to 13.

 16. A method of determining the value of the particulate HBV precore protein in a sample wherein it is calculated by subtracting the measured value of the HBe antigen from the measured value of the HBV precore/core
30 protein determined by a method described in any one of claims 7 to 15.

 17. A method of using the determination of the HBV precore protein determined by a method described in any
35 one of claims 7 to 16 as a pathological marker for HBV infection or type E hepatitis.

18. A diagnostic reagent comprising an assay kit comprising an anionic surfactant and an antibody that recognizes the amino acids at positions -28 to 150 of the HBV precore protein, and a kit for determining HBe antigen.
19. An assay kit and a diagnostic reagent comprising an anionic surfactant, an antibody that recognizes the amino acids at positions -28 to 150 of the HBV precore/core protein, and an antibody that separates the particulate HBV precore/core protein and the HBe antigen.
20. A method of detecting an antibody against the HBV precore protein according to any one of claims 1 to 3.
21. An assay kit and a diagnostic reagent for determining an antibody against the particulate HBV precore protein comprising the HBV precore protein.